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Title:
Improvements in or relating to Coating Devices

Abstract:

1,192,515. Coating webs. M. G. WILLYNCK. 13 May, 1968 [22 May, 1967; 24 Aug., 1967, 26 Oct., 1967; 14 March, 1968], No. 22660/68. Heading D1L. A coating is applied by a partially immersed roller 10 and spread by a doctor 12 consisting of a grooved or threaded rod and supported on a half-bearing 11 whereupon the web 2 passes over a second partially immersed roller 13 which exerts a smoothing action. The threaded rod 14 engages the roller 13 and rotates in opposition to it. Two such coating stations may be provided and the web reversed between them so as to coat both faces.

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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Coating Devices

I, MAXIME GEORGES WILLYNCK, a French citizen of 60 rue de la Gare, 62 Corbehem, France, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to an improved device for continuously coating a sheet of flexible or soft supporting material, such as cardboard, paper, cloth, leather, synthetic material or the like.

In many industries, in particular in the packaging or wrapping industry, producing articles which are not intended to last long and are thrown away after use, it is of primary importance to have at one's disposal a material having both a very good appearance and a good preservation, while being of a cost price which, of necessity, must be very low.

One is thus led to use a sheet of paper or of cardboard of low cost, whose surface is enriched by a coating providing an attractive appearance.

The device and the machine according to the present invention permit a cheap material coated with a finishing product which gives it an even appearance and a perfectly polished surface to be obtained by a continuous method.

The machine according to the present invention is of the type comprising a roller delivering a supporting sheet, or web, in a continuous manner, a plurality of driving rollers and at least one coating roller associated with a tank, or vat, containing the coating product in the liquid or viscid state, and means for fixing and drying the coating product once it has been applied.

It is an object of this invention to provide a device for continuously coating a sheet, said device comprising a feed reel, for

delivering said sheet, a tank containing the coating product in the liquid or viscid state, mechanical means for unwinding said sheet and drying means, said device being characterized in that it comprises a first drum or roller dipped in the tank containing the coating product and adapted to provide the application of a first layer of coating on the lower surface of the sheet passing on it, an adjusting member or doctor constituted by a cylindrical rod provided with transverse and peripheral grooves and mounted on a support having the shape of a half bearing, a second roller dipped in the tank and adapted to provide a smoothing action, and a regular distribution of the coating on the sheet, said second roller being associated with a doctor constituted by a threaded rod resting on the surface of the second roller and rotating in the opposite direction to that of said roller, the sheet being adapted to pass on the first roller on the intermediate doctor rod and on the second roller successively, said rollers and intermediate doctor rod being caused to rotate synchronously and in the opposite direction to the movement of the sheet, under the action of a mechanical device.

It is an other object of this invention to provide a device for continuously coating a sheet, said device comprising a feed reel for delivering said sheet a tank containing the coating product in the liquid or viscid state, mechanical means for unwinding said sheet and drying means, said device being characterized in that it comprises a first coating roller dipped by its lower portion in the coating tank and rotating in opposite direction to that of the sheet which passes on it and receives a layer of coating product, a first smoothing device constituted by a threaded or grooved cylinder freely rotating about its axis and driven by the sheet and a second

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adjusting means constituted by a threaded or grooved rod mounted on a supporting bearing forming a semi cylindrical seat, said rod being rotated in the opposite direction to that of the sheet.

According to a variant, the invention provides a device for continuously coating a sheet, said device comprising a feed reel, for delivering said sheet a tank containing the coating product in the liquid or viscid state, mechanical means for unwinding said sheet and drying means, said device being characterized in that it comprises a rotary drum dipping in the tank containing the coating product and adapted to receive the sheet thus coated by dipping in the coating product, an adjusting doctor constituted by a grooved or threaded rod and adapted to adjust the thickness of the coating layer, said doctor resting on the surface of the drum along a generatrix thereof and being mechanically rotated in the opposite direction to that of the drum and of the sheet.

A coating product specially suited for carrying out the method according to the present invention is obtained by dissolving, until saturation, a polyamide resin in a solvent constituted by an admixture of formic acid and hydrochloric acid to which has been added an appropriate amount of a diluent constituted by an admixture of alcohol and water.

In such an instance, the coating product once applied to the sheet is submitted to a fixing operation, by dipping it in a neutralizing and washing bath constituted by water containing sodium carbonate, said supporting sheet being later on submitted to a drying operation.

To this end, the device according to the present invention comprises a tank, or vat, containing the fixing bath and in which is immersed the sheet coated on both sides with the coating product, said sheet moving across said tank in a continuous manner.

According to a variant, suited to the embodiment according to which the sheet is coated on one side only, the tank or vat containing the fixing product comprises a drum partly immersed in said tank and adapted to receive the non-coated side of said supporting sheet, while the coated side is exposed to the fixing bath.

According to still another variant, the tank, or vat, containing the fixing bath comprises a belt conveyor, the lower portion of which is caused to move in said bath along a curvilinear path, said conveyor being adapted to receive the non-coated side of the supporting sheet, while the other side is exposed to the fixing bath.

Other features and advantages of the present invention will appear from the following description, with reference to the accompanying drawing, in which:

—Fig. 1 is a diagrammatic view of a first

embodiment of a coating machine according to the invention;

—Fig. 2 is a detail view of the coating device;

—Fig. 3 is a detail view of the regulating member;

—Fig. 4 is a diagrammatic view of a second embodiment of the machine according to the invention;

—Figs. 5 to 7 are diagrammatic views respectively of a third a fourth and a fifth embodiment of the machine according to the invention.

In the embodiment shown in Figs. 1 to 3, the supporting sheet, or web, for instance of cardboard, is unwound from a feeding drum or reel 1, in the form of a continuous sheet or web 2. The feeding drum comprises, in particular, a tension adjusting device, constituted for instance, by a band-brake acting upon the axle of the drum. The forward movement of the sheet 2 is provided by a set of driving rollers 3 and 3', which will be described hereinafter.

The sheet, or web, passes over a first roller 4, adapted to adjust the tension and the axial direction, then over a reversing roller 5, which can be moved vertically in order to adjust the slant of said sheet 2 at the point where the latter meets coating device 6.

After having passed over a second reversing roller 7, a coating is applied on the side of the sheet 2 which has remained blank.

Either of the two coating devices 6 and 8 can readily be put out of circuit, if it is desired to coat one side of the sheet only; this is achieved simply by leaving empty the tank of the coating device corresponding to that of the two sides which is to remain blank; again, it is possible to adjust the two coating devices differently, for instance in order to obtain a thickly coated recto-side, the verso-side remaining only slightly coated, or else in order to coat the two sides with coatings of different colours.

The coating device shown in Fig. 2 comprises a tank, or vat, 9, containing the coating product, in the liquid or semi-liquid state. A first drum or roller 10 is dipped in the bath and provides the laying of a first layer on the lower surface of sheet 2 passing over the roller; sheet 2 then passes over the member serving to adjust the layer thickness, said member providing a scraping action resulting in smoothing and more regular distribution of the product on the side of sheet 2; said member is constituted by a cylindrical rod 12 mounted on a support 11 having the shape of a half-bearing; said rod is caused to rotate in the opposite direction to that of sheet 2; to this end, cylindrical rod 12 is actuated by a mechanical driving device connected to the machine motor (said device is not shown). Such a guide-bar permits an even distribution

of the coating and a perfect surfacing of the supporting sheet to be obtained.

Sheet 2 then passes over a second roller 13 itself dipped, by its lower portion, in the product bath; this roller rotates in the opposite direction to the direction of movement of sheet 2 and it perfects the coating by providing a smoothing action and an even distribution of the product on the surface of sheet 2; roller 13 is associated with a device for regulating the product film driven and deposited by it on the lower side of sheet 2; said regulating device is constituted by a threaded rod 14, resting on the surface of roller 13, and kept in position by means of a support 15, said rod rotating in the opposite direction to that of roller 13.

Rollers 10 and 13, rotating in the opposite direction to that of sheet, or web, 2 are driven, preferably synchronously, by a mechanical device controlled by the movement of rollers 3 and 3'; a variator permits the speed of rollers 10 and 13 to be adjusted, thus varying the characteristics, in particular the thickness of the coating layer deposited on sheet 2 by these rollers.

The tank, or vat, comprises a sieve 16 defining, within said tank, a volume in which are collected the cellulose scraps which have been pulled out by the friction due to the movement of the rollers in contact with sheet 2; to this end, two scraping plates 17 and 18 continuously clean the surfaces of rollers 10 and 13, and they reject the cellulose scraps into the portion of the tank defined by sieve 16, which can be regularly cleaned. Such an arrangement prevents the film provided by the second roller 13 from being soiled by the scraps which might deposit on the coated side of the sheet.

After having passed over the two coating devices 6 and 8, the sheet penetrates into a fixing tank 19, in which the chemical reactions intended to fix the coating product and to ensure the solification thereof, are achieved by dipping sheet 2 in a bath of fixing product.

The fixing bath is preferably fed and discharged, in a continuous and counter-current manner, by the inlet and outlet pipes, 20 and 21 respectively. The length of the tank is chosen such that, at the maximum expected speed of sheet 2, the duration of the stay of said sheet in the bath be sufficient to give rise to a complete reaction and a perfect setting of the coating product.

The sheet thus coated then passes between wringing and driving cylinders 3 and 3', then it penetrates into the drying device; the latter is constituted by a chamber 22 comprising a bank of cylinders 23, 23' and 23'', superficially heated by blowing electric radiators 24, 24' and 24'', respectively; these radiators both by convection and radiation, heat the surfaces of the cylinders over which passes

the sheet, thus heated by contact whereas the hot air pulsed by said radiators heats said sheet in the portions between two successive cylinders.

Once it has left the drying chamber, the sheet thus coated and dried is wound and stored on drum 25.

According to the variant shown in Fig. 4, the device is especially intended for coating a sheet on one side only; said device comprises the feed roller 26 and the coating device 27, above described and shown in Fig. 2; the sheet once coated on one side is directed, by reversing rollers 28 and 28', to drum 29 immersed in the tank 30 containing fixing bath 31; the coated side of the sheet is thus exposed to the action of the bath, whereas the verso-side of said sheet is protected against impregnations, since it is applied against drum 29.

In the example shown in Fig. 5, the machine which is again intended for coating the supporting sheet on its recto-side only, comprises feed roller 32 which unwinds the supporting sheet 33; said sheet passes over reversing roller 34, the adjustment of the position of the latter permitting the adjustment of the slant of the sheet 33 at the point where it meets coating roller 34'.

In the present instance, the coating device comprises a first coating roller 34', dipped by its lower portion in tank 36 containing the coating product; this roller rotates in the opposite direction to that of the supporting sheet 33 and, on the lower side of the sheet which is tangent to the top of said roller, the latter deposits a layer of coating product; downstream of the coating roller, the sheet meets a first smoothing device, constituted by a cylinder 37 which is transversely or annularly grooved, said cylinder being mounted free on its axis and being caused to rotate, since it is driven by the sheet, in the same direction as the latter; said cylinder provides a first smoothing of the coating deposited.

An adjusting member already described is located downstream and, preferably, above the tank containing the coating product; said member is constituted by a grooved or threaded rod 35 mounted on a supporting bearing 35' having a semi-cylindrical seat; said rod is mechanically rotated in the opposite direction to the movement of the supporting sheet. Such a device ensures a perfect smoothing action and an even distribution of the product on sheet 33.

The reversing cylinders or rollers 38 and 38' thereafter direct the supporting sheet on to drum 39 of the above described fixing tank 18.

According the example shown in Fig. 6, sheet 40 is continuously unwound from a feed cylinder 41 and passes over a reversing and tensioning cylinders 42 and 42'; said sheet is then driven by drum 43 on which it is applied

which dips it in tank 44 containing the coating product. Once it has left the bath, said sheet is submitted to the action of the member serving to adjust the layer thickness. As above explained, the latter member is constituted by a grooved or threaded rod 45, resting on a bearing 46 and submitted to an adjustable tension. Rod 45 is mechanically rotated in the direction indicated by the arrow, which is the opposite direction to the movement of sheet 40. Said rod rejects the product in excess and leaves on the sheet only a perfectly uniform and constant coating.

In the variant shown in Fig. 7, the coating device is the same as in Fig. 2; the sheet, coated on one side only, passes into the device for fixing the coating product. The sheet is then driven by a conveyor strap 47, which in view of members 48 and 48' assumes an elliptic movement, so that the sheet is firmly and permanently applied against the strap, the blank face of said sheet being thus protected against impregnation by the fixing bath.

After a to-and-fro movement in the bath 49 contained in tank 50, the sheet passes under wringing roller 57, then under reversing roller 52 and it is then directed to the drying chambers.

WHAT I CLAIM IS:—

1. A device for continuously coating a sheet said device comprising a feed reel, for delivering said sheet, a tank containing the coating product in the liquid or viscid state, mechanical means for unwinding said sheet and drying means, said device being characterized in that it comprises a first drum or roller dipped in the tank containing the coating product and adapted to provide the application of a first layer of coating on the lower surface of the sheet passing on it, an adjusting member or doctor constituted by a cylindrical rod provided with transverse and peripheral grooves and mounted on a support having the shape of a half bearing, a second roller dipped in the tank and adapted to provide a smoothing action, and a regular distribution of the coating on the sheet, said second roller being associated with a doctor constituted by a threaded rod resting on the surface of the second roller and rotating in the opposite direction to that of said roller, the sheet being adapted to pass on the first roller on the intermediate doctor rod and on the second roller successively, said rollers and intermediate doctor rod being caused to rotate synchronously and in the opposite direction to the movement of the sheet, under the action of a mechanical device.

2. A device according to claim 1 further comprising a sieve mounted in the tank and

adapted to collect and keep the cellulose scraps resulting from the friction of the sheet against the rollers, said rollers being provided with scraping plates adapted to clean the surface thereof and to reject the cellulose scraps into that portion of the tank defined by the sieve.

3. A device for continuously coating a sheet comprising a feed reel for delivering the sheet, a first coating assembly to coat one face of the sheet and comprising a tank containing the coating product, said tank being associated with a first coating roller, an intermediate adjusting doctor and a second smoothing roller provided with a threaded rod, said rollers and intermediate doctor being caused to rotate in the opposite direction to that of the sheet and as described in claim 1, said device further comprising a reversing roller, a second coating assembly identical to the first one and adapted to coat the other face of the sheet a tank containing a fixing product adapted to ensure the solidification of the coating, said tank being associated with rollings means on which the coated sheet is adapted to pass and dipping in the bath of fixing product, and drying means.

4. A device according to claim 3 in which the rolling means are constituted by a belt conveyor the lower portion of which is caused to move, along a curvilinear path, in the tank containing the fixing product.

5. A device according to claim 1 in which the sheet is coated on its recto side, said device comprising a fixing tank containing a fixing product adapted to ensure the solidification of the coating, said tank containing a rotary drum dipped therein, the upper part of the drum emerging out of the fixing product, said drum being adapted to receive on its cylindrical surface the verso side of the sheet free of coating, whereas the coated recto-side is subjected to the action of the fixing product.

6. A device for continuously coating a sheet according to claim 1, in which the coating product is obtained by dissolving until saturation a polyamid resin in a solvent constituted by an admixture of formic acid and hydrochloric acid to which has been added an appropriate amount of a diluent constituted by an admixture of alcohol and water, the device comprising a fixing bath constituted by water containing sodium carbonate.

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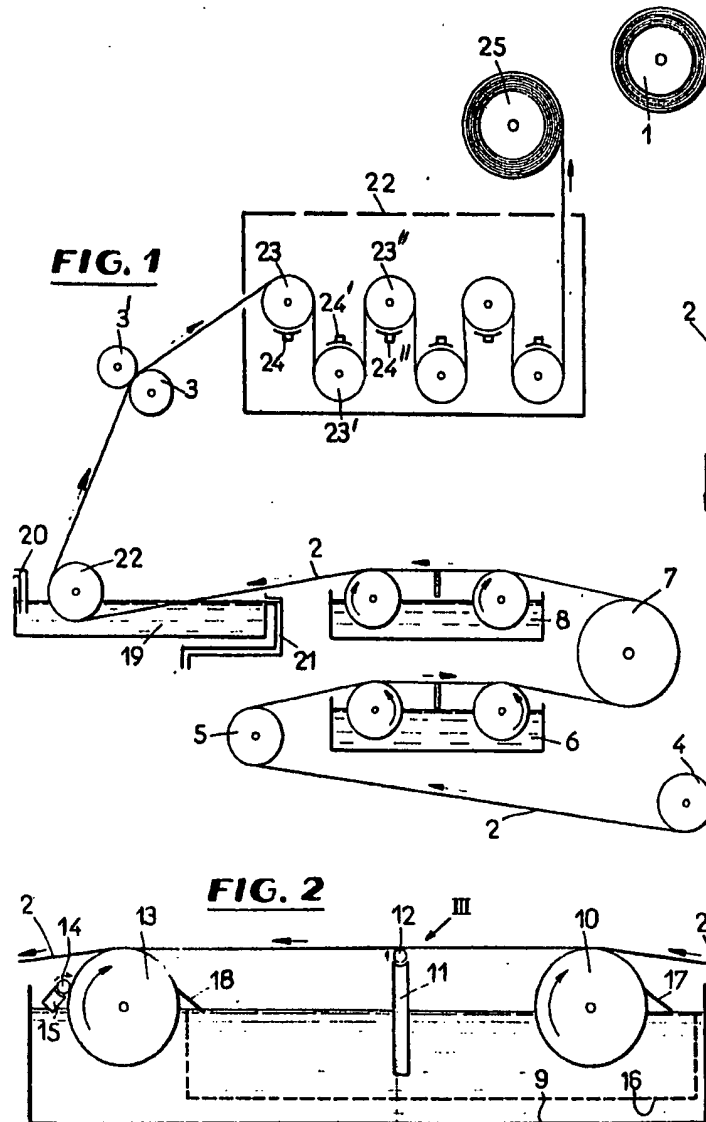
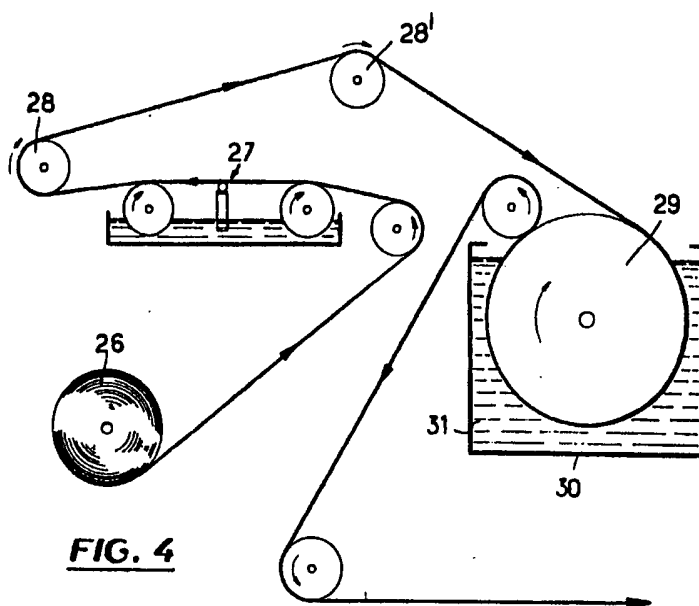
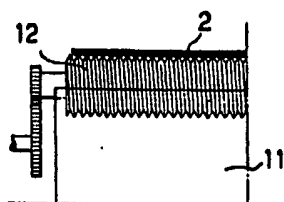
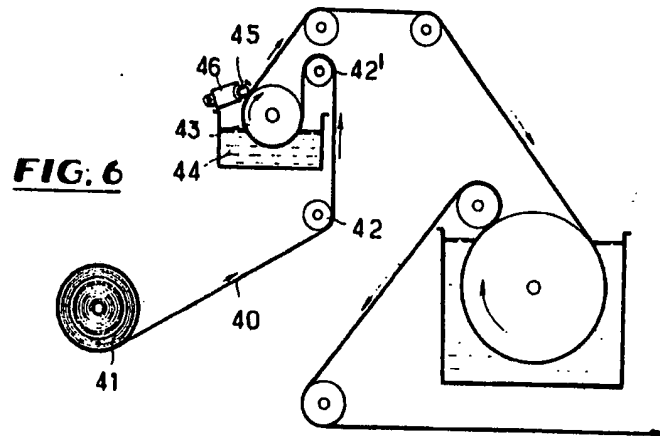
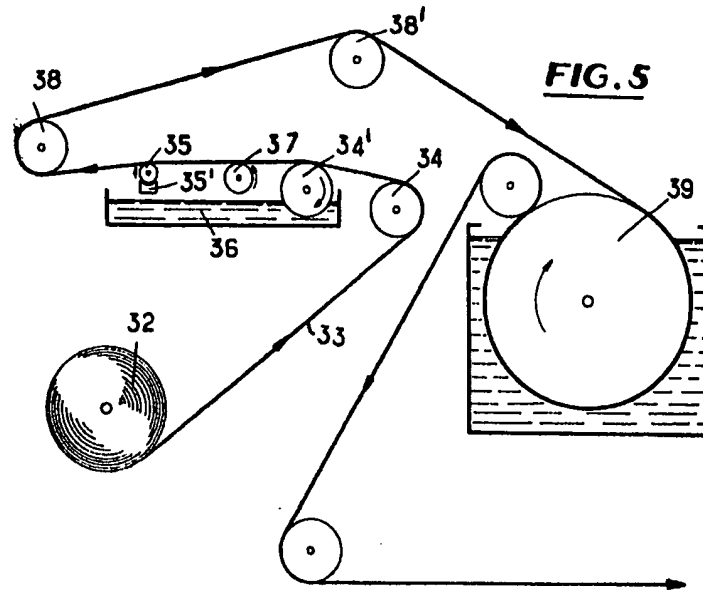
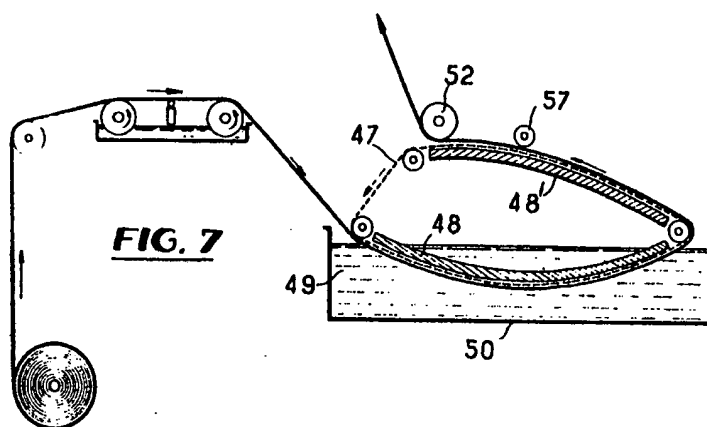


FIG. 3**FIG. 4**





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